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ABSTRACT

This study's purpose was to investigate effects of heightened anxiety upon writing performance of subjects with different levels of creativity and prior anxiety. Eighty ninth-graders were divided by median splits on test scores into high and low creativity and prior anxiety levels. Subjects produced editorial essays half under high and half under low induced anxiety. Measures were obtained on writing style, grammatical errors, lexical diversity, mood, and judged satisfaction. High, as opposed to low, creatives wrote with fewer grammatical, spelling, and total errors, and with greater lexical diversity when experiencing induced anxiety. Induced anxiety was facilitative for high creatives and debilitative for low creatives. (Author)

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SOME EFFECTS OF HEIGHTENING ANXIETY LEVELS ON WRITING PERFORMANCE OF STUDENTS WITH DIFFERENT LEVELS OF CREATIVITY AND PRIOR ANXIETY

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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Anxiety is a variable which may have either facilitative or debilitative effects on student performance in academic or school-related activities. Some studies have shown that anxiety facilitates performance in rote or less complex learning activities and is debilitative of performance in more complex types of learning tasks (Ausubel, 1943; Castenada, et. al., 1956; McGuigan et. al., 1959; Marks and Vestre, 1961; and Stevenson and Odom, 1965). Other studies have shown that personality factors interact with anxiety levels to yield different performance effects given tasks of high complexity. Anxiety facilitates individual performance in complex tasks when anxiety does not threaten the individual's self concept (Van Buskirk, 1961; Witrock and Husek, 1962), when the anxiety is moderate, or when the individual has available defenses for coping with anxiety (Suinn, 1965).

Creativity is one such personality factor which may interact with anxiety levels to produce differing levels of individual performance in complex tasks, a possibility suggested by Ohnmacht (1966).

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Findings of several studies have shown that creative persons have unusually high levels of anxiety (MacKinnon, 1965; and Barron, 1970). Some writers as Torrance and Meyers (1970) have stated that creative productivity will be enhanced by situations which reduce fear and anxiety and thus have suggested by implication that the prevalent anxiety will have debilitative effects. In contrast, Mednick et. al. (1964) have suggested that the creative person may need some motivational stimulus such as that produced by heightened prevalent anxiety levels to facilitate creative productivity. Thus, there is reason to expect that differing levels of anxiety and creativity may have differential interactive effects upon individual performance in complex tasks but no research evidence which will show which of two effects, debilative or facilitative, will likely occur.

The purpose in the present study was to evaluate possible effects debilitative or facilitative, of heightening anxiety levels, upon individual writing perforamnce of junior high grade level student subjects differing in prior anxiety levels. Two types of anxiety were studied. These were: (1) anxiety produced by prior experiences which the individual brings to the experiments such as often referred to as chronic, trait or neurotic anxiety; and (2) anxiety produced by an intentional induction in the context of the experiment which may be described as manifest, momentary, or state anxiety.

Methods and Procedure

Subjects were eighty 9th graders, 42 females and 38 males, who were enrolled in English composition course in a lower middle class socio-economic status school. All subjects were administered the

high school level version of the Remote Associates Test (RAT). They were then divided into high and low creativity levels on the basis of the median split. The split resulted in means of 21.25 for the high creatives, as opposed to 12.15 for the low creatives which differed significantly, $p<.001$ ($F=140.0$, with 1 and 72 d.f.).

These subjects were administered a questionnaire designed to make assessments on the number of prior anxiety experiences associated with school activities and the intensity of the association that the memory of these experiences evoked. The measure of prior anxiety used was the sum total of the intensity scores for these experiences, as measured on 15-point scales. A median split was made on these scores and subjects were divided into high and low prior anxiety levels based on this split. This split resulted in mean scores of 21.14 in high prior anxiety and 16.49 in low prior anxiety conditions. These mean anxiety scores differed significantly, $p<.001$ ($F=107.04$ with 1 and 72 d.f.).

Subjects were assigned at random within RAT and prior anxiety levels and by sex such that half the subjects received a high manifest anxiety induction and half did not. The high anxiety induction was produced as follows: The subjects were all assigned the task of producing an outline for an editorial essay they would have to write. Subjects in the high anxiety condition all received extensive negative feedback while those in the low anxiety condition received only positive affirmation on their outlines. Once the anxiety inducing feedback was given the subjects all were required to produce the editorial essay in class in a one-hour writing session.

Ratings were obtained on 12 items selected from the Nowlis and Green (1970) mood scale. These ratings were obtained prior to the anxiety induction (T_0), after the anxiety induction (T_1), and after the completion of the writing task (T_2). The comparison of differences in mood scale ratings from T_0 to T_1 provided a test of the success of the anxiety induction. That the anxiety induction took is shown by a significant time by induced anxiety interaction $p<.01$ level ($F=6.50$ with 2 and 144 d.f.) with mean scores of 35.65 at T_0 and 40.35 at T_1 for high induced anxiety and mean scores of 37.63 at T_0 and 37.43 at T_1 for low induced anxiety conditions.

Ratings were obtained from each subject on a 7-point scale on judged satisfaction with the writing task (response choices ranging from satisfied to dissatisfied) immediately after completion of the writing task. The written passages which ranged from 100 to 400 words in length were subjected to stylistic analyses. Counts were made on grammatical errors, spelling errors, different words and total words. These were used to form dependent variable measures of spelling errors per hundred words, grammatical errors per hundred words, total errors per hundred words and the type token ratio (TTR).

Separate analyses of variance were made on each dependent variable. Analyses were made in a 2 X 2 X 2 design for all but the mood scale measure with 2 levels each of creativity, induced and prior anxiety. For the mood scale measure, an analysis of variance was made with a 3 X 2 X 2 X 2 design with two levels of creativity, induced and prior anxiety and 3 repeated measures levels of mood. Multiple contrasts were made with the Duncan Range where differences were significant in the analysis of variance.

Results

Table 1 presents the results of the analyses of variance for five of the dependent variables. These were: spelling errors per hundred words, grammatical errors per hundred words, total errors per hundred words, the type token ratio (times 100), and the measures of judged satisfaction.

--Table 1 About Here

Creativity

Table 2 presents the means for high and low level of creativity for the five dependent variables. High as opposed to low creatives wrote with fewer grammatical errors per hundred words (means of 3.16 and 9.44 respectively), fewer spelling errors per hundred words (means of 3.04 and 7.91 respectively), and fewer total errors per hundred words (means of 8.20 and 19.68 respectively). All differences were significant, $\rho<.001$.

--Table 2 About Here--

Prior Anxiety

Table 3 presents the means on high and low levels of prior anxiety for each of the five dependent variables. Individuals with high as opposed to low levels of prior anxiety wrote with more spelling errors per hundred words (means of 6.84 and 4.12 respectively) and more lexical diversity (TTR means of 61.55 and 55.98 respectively). These differences were significant at $\rho<.05$ level.

--Table 3 About Here--

Manifest Anxiety

Table 4 presents the means for manifest anxiety for the five dependent variables. Individuals who received high as opposed to low levels of induced anxiety wrote with somewhat fewer total errors per hundred words (means of 11.47 and 16.41 respectively). The numerical difference between means was a tendency, with level of significance at the $\rho<.10$ level.

--Table 4 About Here--

Interactions

Table 5 presents the Duncan Range tests for the three significant two way interactions. Significant two way interactions were found between creativity and prior anxiety on judged satisfaction, creativity and manifest anxiety on lexical diversity (TTR) and between prior and manifest anxiety on lexical diversity (TTR).

High creatives with high prior anxiety were more satisfied with their performance than all other subjects. This may reflect a higher level of anxiety reduction or it may indicate that the higher anxiety resulted in a more effective production for the high creative.

High creatives wrote with greater lexical diversity (TTR) when experiencing induced anxiety while low creatives wrote with less lexical diversity when exposed to induced anxiety. This finding supports the notion that heightening anxiety levels will be facilitative for the crative person and debilitative for the less creative person, insofaras greater lexical diversity implies greater semantic flexibility and more effective performance. This is

further supported by the finding that the fewest grammatical errors obtained for the high creative in low prior anxiety and high manifest anxiety conditions.

Low levels of manifest anxiety resulted in the greatest lexical diversity (TTR) for subjects with high levels of prior anxiety and the least lexical diversity for those with low levels of prior anxiety. Prior anxiety experiences apparently lead individuals to focus more on different word choices, possibly as a method of reducing prior anxieties.

--Table 5 About Here--

Mood

Table 6 presents the portion of the analysis of variance table attributable to two way interactions. Significant interactions were shown for creativity, prior anxiety and manifest anxiety on mood scale scores over testing times. Table 7 presents the multiple contrasts among means for mood scale scores on the significant two way interactions where a higher mood scale score indicates greater anxiety.

--Table 6 and 7 About Here--

Results of the analysis on the mood scale scores provided evidence for catharsis is for low but not high creatives. Anxiety induced at T_2 was reduced on low but not high creative conditions as shown by mean mood scores for low creatives of 39.23 at T_2 and 35.45 at T_3 and mean mood scores for high creatives of 38.55 at T_2 and 37.53 at T_3.

Catharsis effects were also shown for persons with low but not high prior levels of anxiety. Subjects with high levels of prior anxiety reduced anxiety levels from T_2 to T_3 to levels significantly below the mean levels at T_1 (from means of 34.70 at T_1 to 36.23 at T_2 to 32.38 at T_3). In contrast, subjects with high prior levels of anxiety completed the writing task with higher levels of anxiety than they started with (from 38.58 at T_1 to 41.55 at T_3).

Subjects in the low manifest anxiety conditions experienced cathersis while subjects in the high manifest, induced anxiety condition did not show cathersis. The mood score mean for low manifest anxiety subjects, 34.83 was significantly less than those for low manifest anxiety subjects at T_1 of 37.63 and T_2 of 37.43. In contrast high manifest anxiety subjects increased anxiety as shown by the mean mood scores of 35.65 at T_1 and those of 40.35 at T_2 and 38.15 at T_3.

Discussion

The findings of this study support the notion that anxiety will be facilitative for high creatives and debilitative for low creatives a possibility suggested by Onmacht (1966) and do not support the notion that reduction in anxiety will increase creative productivity. In fact both prior anxiety and manifest anxiety resulted in enhancement for the high creative in that high creatives were more satisfied with their performance in conditions of high prior anxiety and

produced more diversely worded passages in conditions of high manifest anxiety. The facilitative effects of both forms of anxiety may be attributed to possibly higher levels of self concept of the high creatives. High self concepts may enable the high creative to reject successfully possible threats to self concept, and to reduce levels of anxiety which may accompany such threats and this is a possibility we are currently exploring.

The focus on increased word choice by the creative person also raises doubt about a notion proposed by Gaier (1952) that individuals will resolve anxiety by reducing the complexity of the problem by ignoring relevant information. The latter may be the case for the low but not for the high creative. Finally, it may be suggested that the increased performance of the high creatives under high anxiety conditions may have resulted from catharsis. However, this was not the case, as was shown by the fact that low creatives exhibited catharsis as a result of writing while the high creatives did not. Hence the evidence in this study suggests that anxiety either from prior experiences or situationally induced seems to be necessary for the productive performance of creative persons, but this needs further confirmation in future research. It is always possible that a more extreme anxiety induction will be debilitative to high as well as low creatives and this needs to be explored.

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TABLE 1

ANALYSES OF VARIANCE ON TYPE TOKEN RATIO (TTR), GRAMMATICAL ERRORS, SPELLING ERRORS, TOTAL ERRORS, AND JUDGED SATISFACTION FOR SUBJECTS IN CONDITIONS OF CREATIVITY (C), PRIOR ANXIETY (PA), AND MANIFEST ANXIETY (MA)

Source of Variance	d.f.	TTR Mean Square	TTR F	Grammatical Errors Mean Square	Grammatical Errors F	Spelling Errors Mean Square	Spelling Errors F	Total Errors Mean Square	Total Errors F	Satisfaction Mean Square	Satisfaction F
C	1	113.52	1.14	787.59	55.46***	1475.61	18.20***	2635.12	19.25***	.11	-
PA	1	620.63	6.26*	34.19	2.41	147.87	5.66*	44.42	-	2.11	1.01
MA	1	20.19	-	28.64	2.02	5.95	-	488.38	3.57	4.51	2.26
CXPA	1	61.70	-	33.98	2.39	95.06	3.64	294.42	2.15	9.11	4.52*
CXMA	1	391.13	3.94*	11.71	-	33.05	1.26	93.92	-	.31	-
PAXMA	1	417.88	14.29**	27.18	1.91	2.92	-	310.70	2.27	3.61	1.79
CXPAXMA	1	94.08	-	73.53	5.18*	37.67	1.44	186.79	1.36	1.51	-
Residual	72	99.20		14.20		26.13		136.87		2.02	

* $p<.05$
** $p<.01$
*** $p<.001$

Table 2

MEANS FOR HIGH AND LOW CREATIVES* FOR MEASURES OF SATISFACTION, GRAMMATICAL ERRORS, SPELLING ERRORS, TOTAL ERRORS AND THE TYPE TOKEN RATIO (TTR)

	Low Creatives	High Creatives
Satisfaction	5.33	5.25
Grammatical Errors	9.44	3.16
Spelling Errors	7.91	3.04
Total Errors	19.68	8.20
Type Token Ratio	57.58	59.96

*Any two means not underlined by the same line differ significantly $\rho < .05$.

Table 3

MEANS FOR HIGH AND LOW PRIOR ANXIETY FOR MEASURES OF SATISFACTION, GRAMMATICAL ERRORS, SPELLING ERRORS, TOTAL ERRORS AND THE TYPE TOKEN RATIO (TTR)*

	Low Prior Anxiety	High Prior Anxiety
Satisfaction	5.13	5.45
Grammatical Errors	5.64	6.95
Spelling Errors	4.12	6.84
Total Errors	13.19	14.68
Type Token Ratio	55.98	61.55

*Any two means not underlined by the same line differ at the $\rho<.05$ level of significance.

Table 4

MEANS FOR HIGH AND LOW LEVELS OF MANIFEST ANXIETY FOR SATISFACTION, GRAMMATICAL ERRORS, SPELLING ERRORS, TOTAL ERRORS AND THE TYPE TOKEN RATIO (TTR)*

	Low Manifest Anxiety	High Manifest Anxiety
Satisfaction	5.53	5.10
Grammatical Errors	6.90	5.70
Spelling Errors	5.75	5.20
Total Errors	16.41	11.47
Type Token Ratio	58.27	59.27

*Any two means not underlined by the same line differ at the $\rho < .10$ level of significance.

Table 5

MULTIPLE CONTRASTS AMONG MEANS FOR

SIGNIFICANT TWO WAY INTERACTIONS*

	HCLPA	LCHPA	LCLPA	HCHPA
Satisfaction	4.75	5.15	5.50	5.75
Type Token Ratio	55.87	57.25	59.29	62.67
Type Token Ratio	51.27	57.85	60.69	65.26

*Any means not underlined by the same line differ significally $\rho < .05$.

Table 6

ANALYSIS OF VARIANCE FOR CORRELATED COMPONENTS ON MOOD SCALE SCORES FOR THREE TESTING TIMES, T_0, T_1 AND T_2

Source of Variance	d.f.	Mean Square	F
T	2	144.60	5.39**
CXT	2	80.32	2.99*
PAXT	2	108.05	4.03*
MAXT	2	174.20	6.50***
CXPAXT	2	53.32	1.99
CXMAXT	2	17.72	-
PAXMAXT	2	61.02	2.28
CXPAXMAXT	2	27.05	1.01
Residual	144	26.82	

* $\rho<.05$
** $\rho<.01$
*** $\rho<.001$

Table 7

MULTIPLE CONTRASTS AMONG MEANS FOR SIGNIFICANT TWO WAY INTERACTIONS ON MOOD SCALE SCORES*

	LCT_3	HCT_1	HCT_3	LCT_1	HCT_2	HCT_2
CXT	35.45	35.73	37.53	37.55	38.55	39.23
	$LPAT_3$	$LPAT_1$	$LPAT_2$	$HPAT_1$	$HPAT_3$	$HPAT_2$
PAXT	32.38	34.70	36.23	38.58	40.70	41.55
	$LMAT_3$	$HMAT_1$	$LMAT_2$	$LMAT_1$	$HMAT_3$	$HMAT_2$
MAXT	34.83	35.65	37.43	37.63	38.15	40.35

*Any two means not underlined by the same line differ significantly, $p<.05$.